

using that template, the user has the options of identifying the person servicing the alarm, a summary of the alarm and other comments relating to the resolution of the alarm and how it should be resolved. Upon the host computer 161 detecting, at 974, that a resolution of the alarm has been entered, the host computer 161 then, at 976, changes the status of the alarm to that of a resolved alarm for subsequent display and storage.

As part of the process of processing data from an item dispensing system, the host computer 161, at 978, determines whether a report has been requested by a client. If so, at 980, the host computer 161 services that report request. The host computer 161, at 982, determines whether a client update is pending; and if so, at 984, data is transferred from a client, for example, a state computer 171, and stored in the vending machine update database 164 of the host computer 161. It should be noted that the flowchart of FIGS. 13A and 13B is directed to the processing of alarms and is an expansion of the flowchart of FIG. 9. The processing of data by the host computer 161 for reporting, and the processing of data from a client, is discussed in more detail in the description with reference to FIG. 9.

The selectable or programmable fault thresholds of the present invention provide almost unlimited flexibility in being able to monitor the operating states of individual devices within each of the item dispensing systems 149 within the RDAC network 144. First, the present invention has the ability to segregate fatal faults from nonfatal faults. Thus, alarms can be immediately transferred to the host computer 161 upon the occurrence of a fatal fault, that is, a fault indicating the item dispensing system is out of service. However the automatic creation of alarms based on nonfatal faults is avoided, thereby minimizing the occurrence of nuisance alarms and the dispatching of service agents to item dispensing systems that are not out of service. Second, the present invention has the capability of being able to independently adjust the fault thresholds for each of the individual devices within each of the item dispensing systems. Therefore, fault and alarm sensitivity can be adjusted to meet the unique requirements of each item dispensing system 149.

This capability allows nonfatal faults and alarms to be tuned so that operating states of devices within the item dispensing system, which would normally lead to an out of service condition, can be tracked. Thus, a potential out of service condition can be anticipated, and the item dispensing system can be serviced before its occurrence. The present invention provides a significant advantage in being able to tailor and prioritize the generation and transmission of alarms to the host computer 161. This operation of the system controller 145 limits the number of alarms presented to the host computer 161 and substantially reduces the load of the host computer 161 when it is connected to a large number of item dispensing systems. By performing that function automatically, the user of the host computer 161, who is often responsible for the maintenance of hundreds of item dispensing systems, is presented with a burden that is significantly reduced. With the above capability, the allocation of service agent assets can be made more rational, efficient and cost effective to the benefit of everyone.

While the present invention has been illustrated by a description of various preferred embodiments and while these embodiments have been described in considerable detail in order to describe the best mode of practicing the invention, it is not the intention of Applicant to restrict or in any way limit the scope of the appended claims to such detail. Additional advantages and modifications within the

spirit and scope of the invention will readily appear to those skilled in the art. For example, in the described embodiment, the generation of faults and alarms is performed by the system controller 145. While that embodiment is perceived to be more efficient and less costly, as will be appreciated, those tasks may alternatively be performed within the host computer 161 or some other computer either local with, or remote from, the system controller 145.

Further, as will be appreciated, other system configurations can benefit from a distributive processing system that utilizes fault thresholds and faults as described herein. Such configurations include, but are not limited to, configurations in which a retailer collects the cash and thus, does not have bill or coin acceptors. Further, while several specific examples of fault thresholds and faults are described herein, the claimed invention can be used to detect other operating conditions of item dispensers.

In the described embodiment, a determination is made, at 206 of FIG. 12, whether a current state of a fault represents a deterioration of the fault; and an alarm is only provided in the event that a deterioration of the fault is detected. As will be appreciated, the test for a fault deterioration is provided so that faults registered during a current iteration of the alarm manager subroutine can be distinguished from faults registered during prior iterations of the alarm manager subroutine. Faults registered during prior iterations of the alarm manager subroutine have already precipitated the transfer of an alarm to the host computer 161. A retransmission of an alarm for a continuing fault as detected during a current iteration of the alarm manager subroutine is an inefficient user of valuable communications assets. Therefore, the alarm manager subroutine only generates alarms associated with deteriorated faults. As will be appreciated, although less efficient, the test for a deterioration of a fault may be omitted; and an alarm is generated for each current fault that is registered. Redundant alarms may or may not be subsequently identified and eliminated, if desired, either before or after their transmission to the host computer 161.

Therefore, the invention in its broadest aspects is not limited to the specific detail shown and described. Consequently, departures may be made from the details described herein without departing from the spirit and scope of the claims which follow.

What is claimed is:

1. An item dispensing system comprising:

- a plurality of item dispensers located at different retail locations, each of the item dispensers comprising
 - a fault store which stores
 - a fault threshold representing an operating state of the item dispenser, and
 - a fault having two states; and
- a controller in electrical communications with the item dispenser and the fault store, the controller
 - switching the fault to a first state in response to detecting the operating state of the item dispenser represented by the fault threshold, and
 - producing an alarm in response to detecting only a deterioration of the fault; and
- a host computer located geographically remotely from the retail locations, the host computer being in electrical communications with, and receiving the alarm from, the controller.

2. The item dispensing system of claim 1 wherein the controller produces an alarm in response to detecting the first state of the fault.

3. An item dispensing system comprising:
 - a plurality of item dispensers located at different retail locations, each of the item dispensers comprising a bill acceptor adapted to accept bills,
 - a fault store which stores
 - a fault threshold representing a stored number smaller than a number of bills storable in the bill acceptor, and
 - a fault being switchable to a first state in response to the bill acceptor storing a number of bills at least equal to the stored number, and
 - a controller in electrical communications with the item dispenser, the fault store and the bill acceptor, the controller producing an alarm in response to detecting only a deterioration of the fault; and
 - a host computer located geographically remotely from the retail locations, the host computer being in electrical communications with, and receiving the alarm from, the controller.
4. An item dispensing system comprising:
 - a plurality of item dispensers located at different retail locations, each of the item dispensers comprising a coin acceptor adapted to accept coins,
 - a fault store which stores
 - a fault threshold representing a stored number smaller than a number of coins storable in the coin acceptor, and
 - a fault being switchable to a first state in response to the coin acceptor storing a number of coins at least equal to the stored number, and
 - a controller in electrical communications with the item dispenser, the fault store and the coin acceptor, the controller producing an alarm generated in response to detecting only a deterioration of the fault; and
 - a host computer located geographically remotely from the retail locations, the host computer being in electrical communications with, and receiving the alarm from, the controller.
5. An item dispensing system comprising:
 - a plurality of item dispensers located at different retail locations, each of the item dispensers comprising a cash acceptor,
 - a fault store for storing which stores
 - a fault threshold representing a stored value smaller than a desired total cash value to be stored in the cash acceptor, and
 - a fault being switchable to a first state in response to the cash acceptor storing a total cash value at least equal to the stored value; and
 - a controller in electrical communications with the item dispenser, the fault store and the cash acceptor, the controller producing an alarm in response to detecting only a deterioration of the fault; and
 - a host computer located geographically remotely from the retail locations, the host computer being in electrical communications with, and receiving the alarm from, the controller.
6. The item dispensing system of claim 5 further comprising a printer in electrical communications with the controller.
7. The item dispensing system of claim 5 wherein the controller produces an alarm in response to detecting the first state of the fault.
8. An item dispensing system comprising:
 - a plurality of item dispensers located at different retail locations, each of the item dispensers comprising

- a fault store which stores
 - first and second fault thresholds representing respective first and second numbers smaller than a number of items dispensable by first and second item dispensers, respectively, and
 - first and second faults being switchable to a first state in response to the first and second item dispensers dispensing a number of items at least equal to the first and second numbers, respectively, and
 - a controller in electrical communications with the item dispenser and the fault store, the controller producing an alarm in response to detecting only a deterioration of both of the first and second fault states; and
 - a host computer located geographically remotely from the retail locations, the host computer being in electrical communications with, and receiving the alarm from, the controller.
9. The item dispensing system of claim 8 wherein the controller produces the alarm in response to the first and second faults being switched to their respective first and second fault states.
 10. An item dispensing system comprising:
 - a plurality of item dispensers located at different retail locations, each of the item dispensers comprising a fault store which stores
 - a plurality of fault thresholds, each fault threshold representing a first number smaller than a maximum number of items dispensable by a respective item dispenser, and
 - a plurality of faults, each fault being switchable to a respective first state in response to a respective item dispenser dispensing a number of items at least equal to the first number, and
 - a controller in electrical communications with the item dispenser and the fault store, the controller producing an alarm in response to detecting a predetermined number of the faults being switched to deteriorated states; and
 - a host computer located geographically remotely from the retail locations, the host computer being in electrical communications with, and receiving the alarm from, the controller.
 11. The item dispensing system of claim 10 wherein the controller produces the alarm in response to the predetermined number of the faults being switched to their respective first states.
 12. An item dispensing system comprising:
 - a plurality of item dispensers located at different retail locations, each of the item dispensers comprising a fault store which stores a fault threshold and a fault; and
 - a controller which independently operates the item dispenser and providing data relating to items dispensed by the item dispenser, the controller being in electrical communications with the item dispenser and the fault store, and the controller producing an alarm in response to detecting a change of state of the fault;
 - a host computer located geographically remotely from the retail locations, the host computer being in electrical communications with, and receiving the alarm and the data relating to items dispensed by the item dispensers from the controller; and
 - another computer located geographically remotely from the retail locations and the host computer, the other computer in electrical communications with the host computer for receiving data relating to items dispensed at one of the retail locations.

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13. The item dispensing system of claim 12 wherein the controller produces an alarm in response to detecting a deterioration of the fault.

14. The item dispensing system of claim 12 further comprising a fault store for storing

a fault threshold representing an operating state of the item dispenser, and

a fault having two states.

15. The item dispensing system of claim 14 wherein the controller

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switches the fault to a first state in response to detecting the operating state of the item dispenser represented by the fault threshold, and

produces the alarm in response to detecting only a deterioration of the fault.

16. The item dispensing system of claim 15 wherein the controller produces the alarm in response to detecting the first state of the fault.

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